WHAT IS CLAIMED IS:

1. A microneedle device for transporting fluid across a biological barrier, the device comprising:

(a) a fluid transport configuration including:

(i) a substrate defining a substantially planar surface, and

(ii) a plurality of microneedles projecting from said surface;

(b) an abutment member having at least one abutment surface for abutting the biological barrier; and

(c) a displacement mechanism mechanically linking between said abutment member and said fluid transport configuration, said displacement mechanism defining a path of movement of said fluid transport configuration relative to said abutment surface, at least part of said path of movement having a non-zero component parallel to said surface.

2. The device of claim 1, wherein each of said microneedles has a base-to-tip vector defined as a vector from a centroid of a base area of said microneedle to a centroid of a penetrating tip of said microneedle, said microneedles being asymmetrical such that said base-to-tip vector is non-perpendicular to said surface, a direction parallel to a projection of said base-to-tip vector on to said planar surface being taken to define a penetration direction, and wherein at least part of said path of movement has a non-zero component along said penetration direction.

3. The device of claim 2, wherein each of said microneedles is formed such that a projection of said penetrating tip onto said planar surface lies within said base area of said microneedle.

4. The device of claim 1, wherein each of said microneedles is formed with at least one side wall standing substantially perpendicular to said planar surface and at least one wall inclined relative to a perpendicular to said planar surface.

5. The device of claim 1, wherein each of said microneedles is formed with at least two side walls each having a substantially planar face, said side walls being positioned such that an angle between said faces as measured in a plane parallel to said planar surface of said base is no greater than 90°.

6. The device of claim 5, wherein said angle between said faces is between 30° and 70°.

7. The device of claim 1, wherein each of said microneedles is formed with a conduit extending through at least part of said microneedle and at least part of said substrate, said conduit being configured to provide a fluid flow path for transport of fluids through a hole in a biological barrier formed by said penetrating tip.

8. The device of claim 7, wherein said conduit intersects a surface of said microneedle proximal to said penetrating tip.

9. The device of claim 7, further comprising a flow actuation mechanism in fluid connection with said conduits and configured for generating a driving pressure of at least 1000 PSI so as to produce a high velocity fluid jet emerging from said conduits for penetrating into the biological barrier beyond a depth of penetration of said microneedles.

10. The device of claim 1, wherein at least part of said at least one abutment surface is provided with adhesive for maintaining contact between said abutment surface and the biological barrier.

11. The device of claim 10, wherein said path of movement carries said substantially planar surface from an initial position above said at least one abutment surface to a deployed position projecting below said at least one abutment surface for stretching the biological barrier across said substantially planar surface.

12. The device of claim 1, further comprising a vibration generator associated with said fluid transport configuration and deployed so as to generate vibration of said fluid transport configuration so as to enhance penetration of said microneedles into the biological barrier.

13. A method for transporting fluid across a biological barrier comprising the steps of:

(a) providing a fluid transport configuration including:

(i) a substrate defining a substantially planar surface, and

(ii) a plurality of microneedles projecting from said surface;

(b) positioning said fluid transport configuration in contact with the biological barrier; and

(c) generating a displacement of said fluid transport configuration relative to said biological barrier, said displacement having a non-zero component parallel to said surface.

14. The method of claim 13, wherein each of said microneedles has a base-to-tip vector defined as a vector from a centroid of a base area of said microneedle to a centroid of a penetrating tip of said microneedle, said microneedles being asymmetrical such that said base-to-tip vector is non-perpendicular to said surface, a direction parallel to a projection of said base-to-tip vector on to said planar surface being taken to define a penetration direction, and wherein said displacement has a non-zero component along said penetration direction.

15. The method of claim 14, wherein each of said microneedles is formed such that a projection of said penetrating tip onto said planar surface lies within said base area of said microneedle.

16. The method of claim 13, wherein each of said microneedles is formed with at least one side wall standing substantially perpendicular to said planar surface and at least one wall inclined relative to a perpendicular to said planar surface.

17. The method of claim 13, wherein each of said microneedles is formed with at least two side walls each having a substantially planar face, said side walls being positioned such that an angle between said faces as measured in a plane parallel to said planar surface of said base is no greater than 90°.

18. The method of claim 17, wherein said angle between said faces is between 30° and 70°.

19. The method of claim 13, wherein each of said microneedles is formed with a conduit extending through at least part of said microneedle and at least part of said substrate, said conduit being configured to provide a fluid flow path for transport of fluids through a hole in a biological barrier formed by said penetrating tip.

20. The method of claim 19, wherein said conduit intersects a surface of said microneedle proximal to said penetrating tip.

21. The method of claim 19, further comprising generating a high velocity flow of fluid through a bore of the microneedle so as to form a fluid jet with sufficient pressure to penetrate into the biological barrier to a total depth at least one-and-a-half times a penetration depth of said microneedles.

22. The method of claim 13, further comprising positioning at least one abutment surface in contact with said biological barrier, said displacement of said fluid transport configuration being performed relative to said abutment surface.

23. The method of claim 22, wherein said at least one abutment surface is made to adhere temporarily to said biological barrier.

24. The method of claim 23, wherein said displacement of said fluid transport configuration carries said substantially planar surface from an initial position above said at least one abutment surface to a deployed position projecting below said

at least one abutment surface so as to stretch the biological barrier across said substantially planar surface.

25. The method of claim 13, further comprising inducing vibration of said fluid transport configuration so as to enhance penetration of the microneedles into the biological barrier.

26. A microneedle device for transporting fluid across a biological barrier, the device comprising:

(a) a fluid transport configuration including:

(i) a substrate defining a substantially planar surface, and

(ii) a plurality of microneedles projecting from said surface;

(b) an abutment member having at least one abutment surface for abutting the biological barrier, at least part of said at least one abutment surface being provided with adhesive for maintaining contact between said abutment surface and the biological barrier; and

(c) a displacement mechanism mechanically linking between said abutment member and said fluid transport configuration, said displacement mechanism being configured to define a path of movement of said fluid transport configuration relative to said abutment surface, said path of movement carrying said substantially planar surface from an initial position above said at least one abutment surface to a deployed position projecting below said at least one abutment surface for stretching the biological barrier across said substantially planar surface.

27. The device of claim 26, wherein said at least one abutment surface substantially encircles said fluid transport configuration when said planar surface is in said deployed position.

28. The device of claim 26, wherein each of said microneedles is formed with a conduit extending through at least part of said microneedle and at least part of

said substrate, said conduit being configured to provide a fluid flow path for transport of fluids through a hole in a biological barrier formed by said penetrating tip.

29. The device of claim 28, wherein each of said microneedles is formed with a penetrating tip, and wherein said conduit intersects a surface of said microneedle proximal to said penetrating tip.

30. The device of claim 28, further comprising a flow actuation mechanism in fluid connection with said conduits and configured for generating a driving pressure of at least 1000 PSI so as to produce a high velocity fluid jet emerging from said conduits for penetrating into the biological barrier beyond a depth of penetration of said microneedles.

31. The device of claim 26, further comprising a vibration generator associated with said fluid transport configuration and deployed so as to generate vibration of said fluid transport configuration so as to enhance penetration of said microneedles into the biological barrier.

32. A method for transporting fluid across a biological barrier, the method comprising:

(a) providing:

(i) a fluid transport configuration including: a substrate defining a substantially planar surface, and a plurality of microneedles projecting from said surface, and

(ii) an abutment member having at least one abutment surface for abutting the biological barrier;

(b) causing the at least one abutment surface to temporarily adhere to a surface of the biological barrier; and

(c) displacing the fluid transport configuration relative to the abutment surface along a path of movement which carries the substantially planar surface from an initial position above the at least one abutment surface

to a deployed position projecting below the at least one abutment surface so as to stretch the biological barrier across the substantially planar surface.

33. The method of claim 32, wherein the at least one abutment surface substantially encircles the fluid transport configuration when the planar surface is in the deployed position.

34. The method of claim 32, wherein each of said microneedles is formed with a conduit extending through at least part of said microneedle and at least part of said substrate, said conduit being configured to provide a fluid flow path for transport of fluids through a hole in a biological barrier formed by said penetrating tip.

35. The method of claim 34, wherein said conduit intersects a surface of said microneedle proximal to said penetrating tip.

36. The method of claim 34, further comprising generating a high velocity flow of fluid through a bore of the microneedle so as to form a fluid jet with sufficient pressure to penetrate into the biological barrier to a total depth at least one-and-a-half times a penetration depth of said microneedles.

37. The method of claim 32, further comprising inducing vibration of said fluid transport configuration so as to enhance penetration of the microneedles into the biological barrier.

38. A method for injecting fluid through a biological barrier, the method comprising:

(a) employing at least one hollow microneedle to penetrate into said biological barrier to a first depth; and

(b) generating a high velocity flow of fluid through a bore of the microneedle so as to form a fluid jet with sufficient pressure to penetrate

into the biological barrier to a total depth at least one-and-a-half times said first depth.

39. The method of claim 38, wherein energy for said generating a high velocity flow is provided exclusively by force applied manually to a flow actuation mechanism.

40. The method of claim 39, wherein said flow actuation mechanism is configured to generate a pressure of between 1000 and 1500 PSI.

41. The method of claim 38, wherein said total depth is less than 2 mm.

42. The method of claim 38, wherein said total depth is between 0.02 mm and 0.2 mm.

43. The method of claim 38, wherein said total depth is between 0.2 mm and 2 mm.

44. The method of claim 38, wherein said fluid jet has a diameter of less than 0.1 mm.

45. The method of claim 38, wherein said fluid jet has a diameter of between 30 microns and 70 microns.

46. A microneedle device for injecting fluid through a biological barrier, the device comprising:

(a) a substrate defining a substantially planar surface;

(b) a plurality of microneedles projecting from said surface, each of said microneedles having a conduit extending through at least part of said microneedle and at least part of said substrate;

(c) a flow actuation mechanism in fluid connection with said conduits and configured for generating a driving pressure of at least 1000 PSI so as to

produce a high velocity fluid jet emerging from said conduits for penetrating into the biological barrier beyond a depth of penetration of said microneedles.

47. The device of claim 46, wherein said flow actuation mechanism is configured to derive said driving pressure exclusively from force applied manually to said flow actuation mechanism.

48. The device of claim 47, wherein said flow actuation mechanism is configured to generate a driving pressure of between 1000 and 1500 PSI.

49. The device of claim 46, wherein said a height of said microneedles is less than 1 mm.

50. The device of claim 46, wherein said a height of said microneedles is at least 0.05 mm.

51. The device of claim 46, wherein said conduit has a diameter of less than 0.1 mm.

52. The device of claim 46, wherein said conduit has a diameter of between 30 microns and 70 microns.